

CLAIMS

1. A method for processing an acoustic virtual environment in an electronic device, said acoustic virtual environment comprising at least one sound source (300), the method comprising the steps of
 - 5 - establishing a direction dependent filtering arrangement and a set of parameters,
 - associating said direction dependent filtering arrangement with at least one sound source and
 - converting a first signal representing the sound emitted by said at least one sound source into a second signal representing a directed sound in said filtering arrangement in a manner determined by said set of parameters.
- 10 2. A method according to claim 1, comprising the steps of
 - defining a certain reference direction and a set of directions differing from it for said at least one sound source, and
 - associating a filter with each direction differing from the determined reference direction so that the effect of each filter on the signal representing the sound emitted by said at least one sound source depends on a set of parameters relating to the filter.
- 15 3. A method according to claim 2, wherein said parameters relating to each filter are amplification factors in order to determine the relative amplification of the sound directed in different directions from the sound source.
- 20 4. A method according to claim 3, wherein said amplification factors comprise separate amplification factors for different frequencies of the sound in at least one determined direction differing from the reference direction.
- 25 5. A method according to claim 2, wherein said parameters related to each filter are the coefficients $[b_0 \ b_1 \ a_1 \ b_2 \ a_2 \dots]$ of the quotient expression

$$H(z) = \frac{Y(z)}{X(z)} = \frac{\sum_{k=0}^M b_k z^{-k}}{1 + \sum_{k=1}^N a_k z^{-k}}$$

of the Z-transform of the transfer function of the filters.

6. A method according to claim 2, additionally comprising the step of interpolation between said filters in order to model how the sound emitted by said at least one sound source is directed in those directions that differ from the reference direction and said defined other directions.
- 5 7. A method according to claim 1, comprising the steps of
- generating in a transmitting device a certain acoustic virtual environment comprising sound sources,
 - establishing in said transmitting device a set of filters and a set of parameters associated with each filter to define the effect of the filters on sound,
 - 10 - transmitting from said transmitting device to a receiving device information about said parameters associated with each filter, and
 - in order to reconstruct the acoustic virtual environment, creating in said receiving device a filter bank comprising filters whose effect on a signal depends on a set parameters related to each filter, and generating the parameters related to each filter on
 - 15 the basis of the information transmitted by the transmitting device.
8. (A method according to claim 7, wherein the transmitting device transmits to the receiving device information about said parameters related to each filter as a part of a data stream according to the MPEG-4 standard.
9. A method according to claim 1, wherein said sound source is a primary sound
- 20 source.
10. A method according to claim 1, wherein said sound source is a reflection.
11. A system for processing an acoustic virtual environment comprising at least one sound source, said system comprising means for creating a filter bank comprising parametrized filters in order to model how the sound is directed from the sound
- 25 sources belonging to the acoustic virtual environment.
12. A system according to claim 11, comprising a transmitting device and a receiving device and means for realizing an electrical communication between the transmitting device and the receiving device.
13. A system according to claim 11, comprising multiplexing means in the
- 30 transmitting device for adding parameters representing the parametrized filters to a

14. A system according to claim 11, comprising multiplexing means in the transmitting device for adding parameters representing the parametrized filters to a data stream according to the extended VRML97 standard, and demultiplexing means in the receiving device for detecting the parameters representing the parametrized filters from the data stream according to the extended VRML97 standard.